

WHAT IS CLAIMED IS:

1. A method of preparing a diamond body, comprising:
providing a covering layer on at least one surface of the diamond body such that the covering layer adheres to the at least one surface; and
providing the covering layer with a predetermined configuration.
2. The method of claim 1, wherein:
providing a covering layer includes providing a layer of metal on the at least one surface to obtain at least one respective metal surface on the diamond body; and
providing the covering layer with a predetermined configuration comprises polishing the at least one respective metal surface to at least one of a predetermined roughness and a predetermined flatness.
3. A method of manufacturing a diamond heat spreader, comprising:
providing a covering layer on at least one surface of a diamond layer such that the covering layer adheres to the at least one surface; and
providing the covering layer with a predetermined configuration for the at least one surface to obtain at least one respective thermal coupling surface for the diamond heat spreader.
4. The method of claim 3, wherein:
providing a covering layer comprises providing a layer of metal on the at least one surface to obtain at least one respective metal surface; and
providing the covering layer with a predetermined configuration comprises polishing the at least one respective metal surface to obtain at least one respective polished metal surface having at least one of a predetermined roughness and a predetermined flatness.
5. The method of claim 4, wherein providing a covering layer comprises
providing a final layer on the at least one respective polished metal surface.

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6. The method of claim 5, wherein providing a final layer comprises metal plating the at least one respective polished metal surface.
7. The method of claim 6, wherein metal plating comprises plating the at least one respective polished metal surface with at least one of Au, Ni and Ag.
8. The method of claim 6, wherein plating comprises plating pre-selected regions of the at least one respective polished metal surface to obtain at least one respective thermal coupling surface having pre-selected regions made of different metals.
9. The method of claim 3, wherein providing a covering layer comprises providing an adhesion layer directly on the at least one surface such that the adhesion layer adheres to the at least one surface.
10. The method of claim 9, wherein providing an adhesion layer comprises sputtering the at least one surface with a metal adapted to adhere to diamond.
11. The method of claim 10, wherein sputtering comprises sputtering the at least one surface with Ti.
12. The method of claim 9, wherein providing a covering layer comprises providing a layer of metal on the adhesion layer of the at least one surface to obtain at least one respective metal surface.
13. The method of claim 12, wherein providing a covering layer comprises providing a barrier layer between the adhesion layer and the layer of metal on the at least one surface.

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14. The method of claim 3, wherein the at least one surface comprises two opposite sides of the diamond layer.
- ~~15. A method of preparing a diamond heat spreader, comprising:~~
providing a covering layer on at least one surface of a diamond layer such that the covering layer adheres to the at least one surface, providing a covering layer comprising:
providing an adhesion layer directly on the at least one surface such that the adhesion layer adheres to the at least one surface; and
providing a barrier layer on the adhesion layer on the at least one surface; and
providing a layer of metal on the barrier layer to obtain at least one respective metal surface; and
providing the covering layer with a predetermined configuration comprising polishing the at least one respective metal surface to obtain at least one respective polished metal surface having at least one of a predetermined roughness and a predetermined flatness.
16. The method of claim 15, wherein providing a covering layer further comprises providing a final layer on the at least one respective polished metal surface.
17. The method of claim 16, wherein providing a final layer comprises metal plating the at least one respective polished metal surface.
- ~~18. A diamond heat spreader comprising:~~
a diamond layer exhibiting roughness on at least one surface thereof; and
a covering layer adhered to the at least one surface of the diamond layer and having at least one respective thermal coupling surface exhibiting at least one of a predetermined roughness and a predetermined flatness.
19. The diamond heat spreader of claim 18, wherein the covering layer comprises a layer of metal on the at least one surface defining at least one respective polished metal surface having the at least one predetermined roughness and

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predetermined flatness.

20. The diamond heat spreader of claim 19, wherein the covering layer further comprises a final layer on the at least one respective polished metal surface, the final layer defining the at least one respective thermal coupling surface.
21. The diamond heat spreader of claim 20, wherein the final layer comprises a layer made of at least one of Au, Ni and Ag.
22. The diamond heat spreader of claim 20, wherein the at least one respective thermal coupling surface has pre-selected regions made of different metals.
23. The diamond heat spreader of claim 19, wherein the covering layer further comprises an adhesion layer disposed directly on the at least one surface such that the adhesion layer adheres to the at least one surface and supports the layer of metal thereon.
24. The diamond heat spreader of claim 23, wherein the covering layer further comprises a barrier layer disposed between the adhesion layer and the layer of metal.
25. A heat spreader package comprising the diamond heat spreader of claim 18, and further including a heat sink thermally coupled to the diamond heat spreader.
26. The heat spreader package of claim 25, further comprising a load distribution lid connected thermally coupled to the heat sink and to the diamond heat spreader.
27. The heat spreader of claim 25, further comprising a load distribution perimeter connected to the diamond heat spreader, wherein the diamond heat spreader and the perimeter together form a load distribution lid thermally coupled to the heat sink.

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28. A microelectronic package comprising the heat spreader package of claim 25, and further including a die package having a die and a land grid array thermally and electrically coupled to the die, the heat spreader package being thermally coupled to the die package.

29. A diamond heat spreader comprising:
a diamond layer; and
means adhered to at least one surface of the diamond layer for providing at least one respective thermal coupling surface of the heat spreader.

30. The diamond heat spreader of claim 29, wherein the means for providing comprise a covering layer.

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